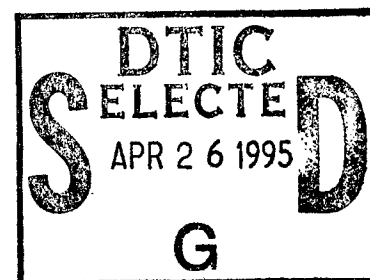


Recommendations for the 21st Century Classroom

Derived from Observations of the 1994 Battle Command
Elective and Advanced Warfighting Experiments



Monograph by
Louis G. Bornman, Jr.



TRADOC Analysis Center
Study and Analysis Center
Study Directorate
(913) 684-9169

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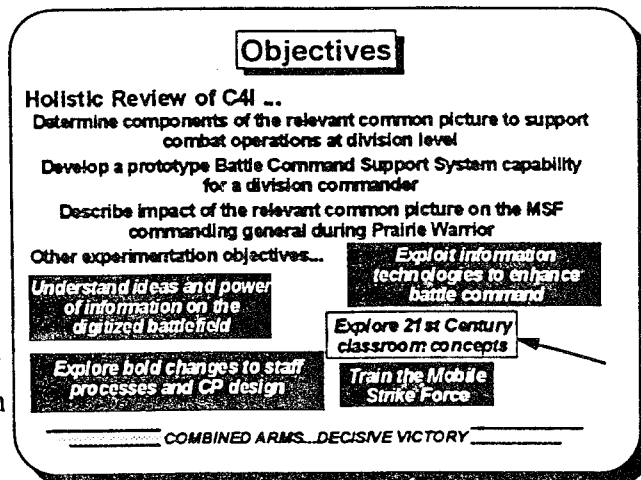
Battle Command Elective and Advanced Warfighting Experiments.

Purpose

This paper presents observations and recommendations for design of the 21st century classroom for the U.S. Army Command and General Staff College (CGSC). These observations and recommendations were derived from several advanced warfighting experiments (AWEs) conducted by the Battle Command Battle Laboratory (BCBL) at Fort Leavenworth, Kansas. The experiments were aimed at advancing the art of battle command, and were designed to complement two activities associated with the CGSC. These activities were the Battle Command Elective (BCE), a pilot course developed jointly by BCBL and CGSC, and the Prairie Warrior student exercise conducted by the college in May 1994. This paper was prepared by the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) in support of BCBL.

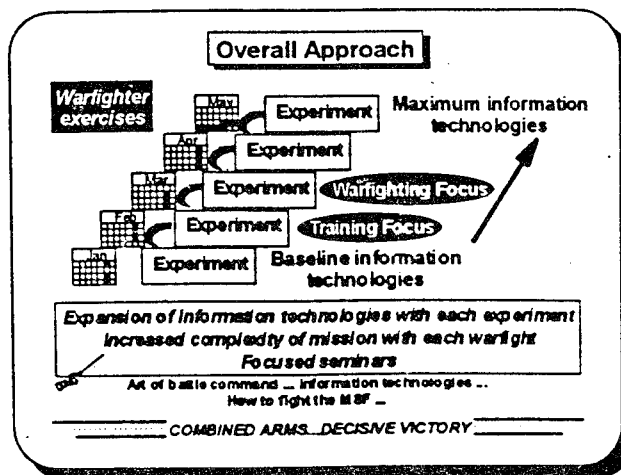
Objectives

While the AWEs were designed to address several objectives, the principal focus was to support the investigation of the Louisiana Maneuvers (LAM) issue assigned to the BCBL, Holistic Review of Command, Control, Communications, Computers, and Intelligence (C4I). As shown here there were several implied tasks and secondary objectives subsumed under this issue. This paper primarily addresses the secondary objective of exploration of 21st Century classroom concepts.



Overall Approach

BCBL's initial concept was to conduct five AWEs between January and May 1994, one each month. Associated with each AWE was a warfighting exercise which provided a set-piece for exploring implied tasks and secondary objectives. The experiments during the first months comprised the BCE and the May experiment was a subset of the Prairie Warrior exercise. The exercises began from a baseline of information technology and moved towards a digitized force, to investigate and identify components of the relevant common picture and useful capabilities to contribute to the



development of that picture. CGSC students were participants in the experiment, providing the key leaders and staff of an organization known as the Mobile Strike Force (MSF). This experimental force will be used by the Army to develop future concepts and organizations leading the Army to the 21st century, through interaction with leaders who will be senior Army leaders in the time frame when such a force might be fielded. In this series of experiments the MSF was characterized as a 1998+ force. With each AWE, the MSF staff received a mission order and was required to develop plans to execute their assigned mission. The MSF Commander directed the battle operations from a forward command post (CP), with selected key staff members; the remainder of the headquarters staff was located in a rearward CP, and conducted planning operations from that cell. Subordinate commanders within the MSF were also physically segregated from the forward and rearward CPs. In addition to the warfighting exercises, a series of seminars provided information on battle command, information technologies, and warfighting concepts for the MSF. During the exercises, data collectors observed the participants performing their associated command and staff functions and recorded events relative to the objectives of the study. These data included video and audio recording, time and task activity listings, and narrative descriptions of observed activities and their impressions on the observer.

Our Hypothesis

When the study team began making observations during the very first experiments the team assumed one underlying hypothesis, that the CGSC students all had some moderate level of computer literacy. That is, the team assumed that they all had experience in using personal computers (PCs) through assignments to various Army organizations, that they all had some

Hypothesis

The officer corps possesses a moderate level of computer literacy including an awareness of Windows

awareness of a Windows type environment, using a word processing software program, maybe some contact with the use of spreadsheets and electronic messaging or E-mail. This hypothesis was based on the team's collective experience and knowledge that computers are wide spread in use throughout the Army, both in TDA and TOE organizations and units. The team also surmised that as the students had already completed half of the CGSC course year they had gained some limited knowledge of computers or experience with them through their prior course work.

Results of AWE Observations

From the very first exercise, data collectors observed that the hypothesis concerning basic computer literacy was wrong. Most of the student participants did not have even a basic knowledge of the rudimentary computer concepts to use the file transfer capabilities provided during the first AWE. During later AWEs this type of observation continued and became even more pronounced as more technological capabilities were introduced to the students and into the exercises. Tasks considered simple to data collectors such as knowing how to navigate through a Windows type environment on a computer, appeared to be confusing and complex actions for a

majority of the students. Our observations led us to group the students into three basic categories:

- ♦ Those who were computer literate. These students (4 to 6 of the 28 students (15 to 20 %)) could quickly grasp what was going on and turn around and apply it to the situation at hand. These students generally had and used their own computers at home or had been exposed to computers through their military assignments and had learned to use them on the job. They had a good solid foundation and working knowledge of the software and generally how to navigate through a Windows type environment. These students could begin to operate and apply the hardware and software technologies presented to them with little or no training.
- ♦ Those who had little or no computer literacy, but who were willing to try to learn how to use the systems they were given. They tended to have a strong belief that these systems could really help them perform their command and staff functions better. 18 to 20 of the 28 students (65 to 70%) fell in this category.
- ♦ Those who had no computer literacy and apparently had no desire to learn. Approximately 4 of the 28 students (15%) fell in this category. For them it seemed that computers could be considered as something that might make a good boat anchor. Complete understanding of this phenomenon is not known, but may be related to such feelings as fear, lack of confidence based on limited exposure, disdain for something they felt was trying to take the place of a human, or a sense that to operate a computer was not an officer's job.

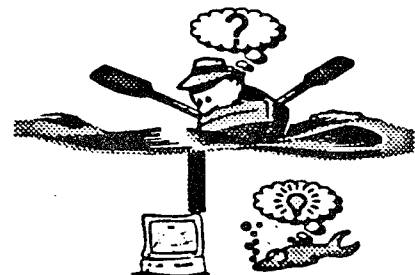
Computer Literate



Computer Illiterate but Trainable



Computer?



Possible Reasons for "Boat Anchor" Phenomenon

- ♦ Fear
- ♦ Lack of confidence based on limited exposure
- ♦ Disdain for a machine replacing a human
- ♦ Sense that operating a computer is not an officer's job

The Need for Computer Literacy

Why must the Officer Corps be computer literate? There are those who might argue that the Officer Corps does not need to be computer literate to function in today's environment or that of the future. However, there are some very strong arguments for a computer literacy requirement. First, there is the basic philosophy that officers must be highly technically proficient. They must be able to do everything their enlisted men and women do and a lot extra. If the officers are not computer literate, they will not know if the operators are executing the right operations and giving them the right feedback. How will they train subordinates? How will the officers know and understand the capabilities and limitations of the equipment their soldiers are using? Second, the Army can't continue to rely on getting operators (either enlisted or civilian) with every new piece of information technology that is procured and issued to the field. Human resources are our most expensive asset. In the current and foreseeable future we can not expect to get any increase in personnel resources. In all likelihood those resources will shrink drastically and those that are available will be at a premium. Thirdly, the introduction of this information technology has the potential to allow the Army to reduce some if not most of its staff sizes. This technology has the potential to reduce the need for human resources to handle the many repetitive, well-defined tasks associated with status reporting and updating and posting unit locations. All of that can and will be done through automation.

To Win The Information War

- Officers must be highly technically proficient
- The Army can't continue to rely on getting an operator (enlisted or contractor) with every new piece of information technology
- Technologies provide a "potential" for reducing staff sizes
- To meet 2010 information age computer literacy requirements the Army must begin developing /training computer literate leaders today!

**Leaders at all levels must be computer literate—
We can't wait to grow them from lieutenants—**

If the Army really plans to move into the information age, then we are already behind the power curve from the human resource perspective. If a majority of the current Army mid-level leadership is lacking in computer literacy today, then how much greater will that deficiency be ten to fifteen years from now when this same group becomes the senior leadership of the Army? Where will the expertise and guidance come from between now and the future to guide the Army development in the information age, maturing and expanding its capabilities? If we see that we are falling short of a perceived level of computer literacy and competency today, what will the deficiency be in ten to fifteen years? What will the computer literacy and competency level requirements be ten to fifteen years from now for Army leaders to be able to properly exercise command and control functions on the battlefield? All of these questions need to be addressed and done so in short order. The bottom line is we cannot wait to grow computer literate senior leaders to guide the Army from computer literate lieutenants. It just takes too long. We must begin now to train the entire leadership at all levels in computer literacy.

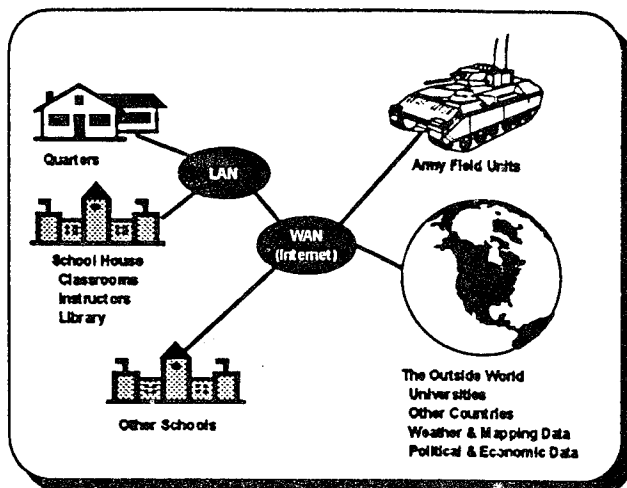
Reasons to Begin Mid-level Leader Computer Literacy Training Today

- ♦ If there is a deficiency today, how big will it be tomorrow?
- ♦ Where will information operations expertise and guidance come from between now and the future?
- ♦ What will the future computer literacy requirements of the Army be?

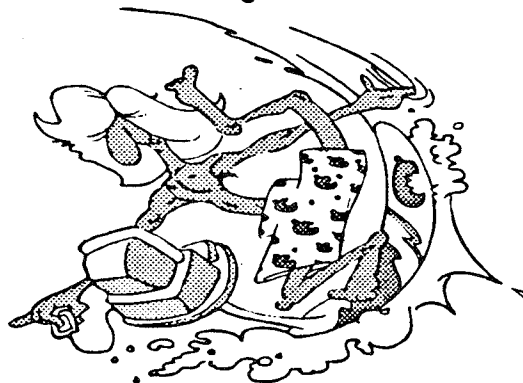
Developing Computer Literacy

How do we Develop a Moderate Level of Computer Literacy? By total immersion in computer use and operation -- baptism under fire, if you will. Use of a computer in CGSC, branch specific Basic courses, Advanced courses, and the Army War College should be the only method by which students receive information (texts, presentation slides, handouts, class schedules, messages) take tests and submit written assignments. Local area network (LAN) and wide area network (WAN) connections should be provided in each classroom for each student and in each set of student quarters (and maybe all others too). Connections should also be provided to the Internet so that the students can learn about other information sources that exist and how to access those resources. The service schools can also provide special application software to the students to assist them in every aspect of their course work, future military assignments, and personal lives. These tools may include capabilities like digital mapping, decision support, planning, allocation and risk assessment.

A real foundation to developing computer literacy is, as we said, total immersion. What better way to do that than for every officer to have his own computer? There are two ways to do this: 1) issue each student a piece of current Army TOE equipment such as a commanders tactical terminal (CTT) or maneuver control system (MCS) (of course this is totally ridiculous and cost prohibitive) or 2) issue commercial off-the-shelf (COTS) computers to officers, or better, reimburse the student officer for his purchase of a computer. The reimbursement program has many advantages over the other. It takes the Army out of the procurement process with all of its insistent demands for detailed requirements definition, competitive bidding, litigation, legal, and political problems. It can save months or years of time and millions of dollars. For example the Army could specify a minimum set of specifications that the computers and software would have to meet and manufacturers



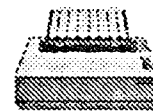
Surfing the Internet



What Each Officer Might Have (Minimum)



486/66 Mhz Laptop w/
Mouse
Active Matrix Color Monitor
Built In Fax Modem
12 - 16 Meg RAM
340 Meg Hard Drive
Type II PCMCIA Slot
4 Hour Battery Life



Portable Ink Jet printer



Integrated Software package which includes:
Windows (or equivalent environment)
DOS
Word Processing
Graphics
Spreadsheet
Database Manager
Electronic Mail
Personal Organizer

would be required to meet those specifications to meet the conditions of the reimbursement program. Then, when the students arrive for class, the first scheduled event is a computer fair where multiple manufacturers or dealers show up and display and sell their wares to the students. The students' purchases are covered by a basic monetary level provided by the Army. Anything extra which exceeds the minimum standards, the students pay for out of their own pockets. This type of setup also provides for a wider selection of hardware and software products and services than if the Army bought the systems and issued them, but still allows the Army to define some standards for compatibility of hardware and software. It would also provide for a wider commercial support base for future private product development and support based upon Army user experience, recommendations and product complaints. Part of the cost of this program may even be paid for by the savings in time and money in paper and printing of student texts and classroom support materials. It could also change the way the corresponding studies program is conducted.

COTS Reimbursable Program Advantages

- ♦ **Saves time, money, and resources**
- ♦ **Establishes minimum set of specifications for hardware and software to qualify for the program**
- ♦ **Uses a vendor fair where students select hardware and software they want**
- ♦ **Student purchases covered by a base level of Army monetary support**
- ♦ **Anything exceeding the minimum specifications paid for by students**
- ♦ **Provides wider selection of hardware and software products and services**
- ♦ **Provides a wider base for future private product development and support**

Another key point of this type of program is that it can provide a window today to the Army's future operating capability in that students would take their computers with them to their next assignment and use them in the same manner they had in their schools, for planning and operations. The Army field units would then have to provide the connectivity for all of these computers through LAN/WAN linkages and network/system management and field communications linkages. There would also be a need for other support items such as large screen displays and printers for the various output products. This could be a very unique way of providing computers in every unit in the Army without having to go through the normal long drawn-out procurement process. So, maybe the Army should consider getting out of the computer hardware and software development business and change over mainly to COTS products that can be adopted for use because they can already address a majority of the Army's needs. For example, using laptop computers with a commercial integrated software package like the Windows-based Lotus SmartSuite or Microsoft Office can provide a portable system with one integrated set of programs that include work processing, spreadsheet, database management, graphics package, electronic mail and personal organizer. Non-integrated groupings of software should not be pursued because of problems that will exist with compatibility of the software.

This computer allowance or reimbursement should then be renewed every 3 to 5 years to allow the officers and the Army to keep up with changes and improvements in technology.

Summary

Through the full set of AWEs in the BCE course, the study team identified a deficiency in the level of computer literacy among the student participants. This deficiency may be reflective of the entire officer corps and must begin to be addressed now for the Army to be able to meet its information operations objectives over the next ten to fifteen years. The best place to begin to address the deficiency is in the Army officer education system. The best method of addressing the deficiency may be through the adoption of a program that necessitates officers develop a minimum level of computer literacy by total immersion in the technologies and provides an opportunity for all to achieve that competency without undue personal financial burden. The use of a baseline reimbursable program which allows officers to buy information technology hardware and software for use in both the school house and their duty assignment environment could restructure the Army's approach to officer education and instruction as well as its procurement and fielding methodology for supporting the transition to information operations. This approach is in consonance with the Army Enterprise Strategy.